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## Does early removal of Foley's catheter have any influence on infection of recipient post renal transplantation? Is it safe? A randomized clinical trial

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### ABSTRACT

**Background:** Kidney transplant is a fair option for treatment of a chronic renal failure. Although the outcome and results of kidney transplant are good, it may be associated with some complications. One of the important complications is urinary infection.

**Objectives:** The aim of this study was to investigate the role of early removal of the catheter in renal transplant patients on the reduction of urinary tract infections.

**Patients and Methods:** This study was conducted as a clinical trial. Around 88 transplanted patients were enrolled and randomly divided into two groups. In the first group, the patients were taken 3 days after the transplant, and in the second group, patients were removed 7 days after the Foley catheter transplant. Urine culture was performed on two occasions. Then, the patients' data were analyzed using SPSS version 20.

**Results:** After examination of urine and analyzing the results with *t* test, it showed that infection of urine in the time of removal of urethral catheter was lower than 7 days after removing urethral catheter ( $P < 0.05$ ). In patients in whom catheter of urethral had been removed 3 days after the operation, approximately urinary tract infection (UTI) was 50% less than those in whom urethral catheter was removed 7 days after the operation.

**Conclusions:** Early removal of catheter has fundamental effects on UTI after kidney transplant and it seems that early removal of urethral catheter may be safe and reasonable in renal transplant of the recipient patient.

### Implication for health policy/practice/research/medical education:

In a randomized clinical trial on 81 kidneys recipients due to end-stage renal failure, we found that early removal of urethral catheter (3 days after kidney implantation) is an important factor for reducing infection after kidney transplant and it is safe.

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### 1. Background

The rate of chronic renal failure of patients is increasing (1), and hitherto kidney replacement has been the best option for treatment of renal failure (2). In this modality treatment, there are many complications that one of them is urinary tract infection (UTI) which may result in graft loss (3-7). The most common infection in post-kidney transplant is UTI (3-5). Sometimes the UTI may result in graft or kidney loss (8-14). UTI depends on many factors including gender, reflux of urine, stent of DJ stent, Foley's catheter, age, diabetic state, re-

transplantation, rejection and immunosuppression (15). Of them, sex (female) and urologic factors are more of a cause for the UTI than others (6).

### 2. Objectives

In our department we routinely removed urethral catheter 7 days after kidney transplant. We decided to remove catheter at 3 days after transplantation instead of seven days after transplantation and then evaluate UTI in them and compare the results with the results of patients who our routine catheter removal was done seven days

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after transplantation.

### 3. Patients and Methods

#### 3.1. Study patient

From April 2016 to September 2016 all 118 kidneys of recipient patients have been included in a clinical study about UTI and urethral catheter. All patients suffered from end-stage renal failure and had negative urinary culture and had been operated by the same team of surgery using three medications (tacrolimus, prednisolone and mycophenolate mofetil). Any patient with history of lower urinary tract disease and abnormality of lower urinary tract and also any patient who disagreed with the study was excluded. Therefore 20 patients were excluded and finally 88 patients were included in the study (Figure 1). The patients were all divided into two groups randomly. Urethral catheter was removed after 3 and 7 days of kidney transplantation operation in the first and second groups, respectively. In all of the patients two urine samples were provided for analysis and culture; one sample at time of removing urethral catheter and second sample at 7 days after removal of urethral catheter.

#### 3.2. Ethical issues

The research followed the tenets of the Declaration of Helsinki. Consent for operation and study had been

taken. The ethical committee of Tabriz University of Medical Sciences approved the research. All patients' information remained confidential. This study was registered in the Iranian registry of clinical trials (identifier: IRCT20150808023559N14; <http://www.irct.ir/trial/20086>).

#### 3.3. Statistical analysis

The results entered SPSS version 20, and were analyzed with *t* test and chi-square test. Additionally, *P* value less than 0.05 were considered statistically significant.

### 4. Results

This study included 88 kidney transplant recipients in two groups, each group consisting of 44 patients. In the first group, 25 patients (56.8%) were males with an average age of  $43.52 \pm 13.6$  years. In the second group, 25 patients (56.8%) were females with average age of  $43.20 \pm 14.39$  years. In 81 kidney recipients the donors of them were unrelated live donor and only 7 kidney transplant patients received kidney from cadaver. The results of this study and its analysis with chi-square test showed that gender, the presence of diabetes mellitus, high blood pressure, cardiac ischemia, hyperlipidemia and smoking in the two groups did not differ significantly (Table 1). After examination of urine and analyzing the

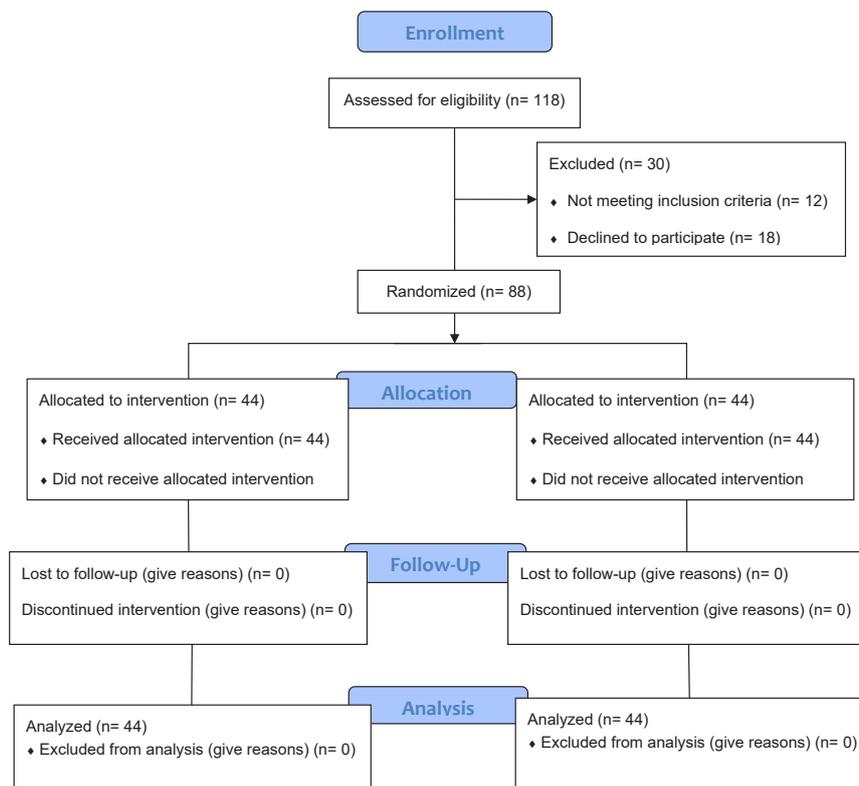


Figure 1. The study flowchart based on CONSORT 2010.

**Table 1.** Demographic information of patients

Variable		3 days		7 days		P value*
		No.	%	No.	%	
Gender	Male	25	56.8	19	43.2	0.201
	Female	19	43.2	25	56.8	
Diabetes mellitus	Yes	10	22.7	8	18.2	0.597
	No	34	77.3	36	81.8	
Hypertension	Yes	28	63.3	26	59.1	0.661
	No	16	36.4	18	40.9	
IHD	Yes	2	4.5	3	6.8	0.645
	No	42	95.5	41	93.2	
Hyperlipidemia	Yes	9	29.5	9	29.5	1.000
	No	35	79.5	35	79.5	
Smoking	Yes	4	9.1	8	18.2	0.214
	No	40	90.9	36	81.8	

\* Chi-square test.

results with *t* test, it showed that infection of urine in the time of removal of urethral catheter was lower than seven days after removing urethral catheter ( $P < 0.05$ ). In patients in whom catheter of urethral had been removed 3 days after the operation, approximately UTI was 50% less than those in whom urethral catheter was removed 7 days after the operation (Table 2).

## 5. Discussion

Renal transplantation is an ideal care for renal failure patient (1). However, it may be associated with some complications like UTI with bacterial infection as the most common complication (3-5). In our department also UTI is a common complication of kidney transplantation. UTI has many risk factors including gender kind, age, catheter, cadaver donor, re-transplantation, diabetic state and reflux (15).

From above-mentioned risk factors, female gender is very important for prone to UTI (16), and most of UTIs in renal recipients occur in the first month of post-transplant (17-20). Rubin and Tolkoﬀ-Rubin disclosed that more than 80% of kidney recipients experienced UTI during first year of post-transplant (21). UTI in the first month of post-transplantation is a pivotal risk factor for inducing septicemia and mortality in kidney recipients (22-24). Anti-rejection medicines, urethral catheter and intravascular catheter increase the risk of

infection in kidney transplant of recipients (25). Using prophylaxis as a preventive treatment for UTI, it occurs in first months in high incidence in kidney recipients (20). Dupont et al highlighted the worse impact of UTI on graft and patient's survival in kidney transplant (26). In another investigation, prevention and treatment of the infection is very important in the success of kidney transplantation (27). One of important methods for prevention of UTI, as a significant and common adventure in renal recipient, is reasonable management of urethral catheter while its insertion is essential in renal transplant.

bacteriuria without any symptom is the most presentation of UTI in renal transplantation and treatment dose not affect it (28).

From all mentioned risk factors for UTI, one factor which depends on urologist for reducing the development of UTI is the catheter. In our department the incidence of UTI is as high as the result of investigation (in group 2) but in contrast to the group 1, early removal of catheter had many effects at the incidence of UTI. The result of group one in comparison to group two, showed a significant prevention of UTI in renal transplant patients.

## 6. Conclusions

It seems that early removal of urethral catheter (three days after kidney implantation) is an important factor for

**Table 2.** Relationship between the study groups and the incidence of infection by the time of the culture

Variable		3 days		7 days		P value*
		No.	%	No.	%	
First day catheter removal day	Positive	2	4.5	18	40.9	0.000
	Negative	42	95.5	26	59.1	
Seventh day after catheter removal	Positive	7	15.9	18	40.9	0.009
	Negative	37	84.1	26	59.1	

\**t* test.

reducing infection after kidney transplant and it is safe.

### Limitations of the study

This investigation was performed on a limited proportion of patients who had kidney transplantation and we suggest larger studies on this aspect of renal transplant patients.

### Authors' contribution

AZ and FK conducted the research. SZ, MM and AB searched the literature, analyzed the data and prepared the draft. AZ contributed to data collection and patient selection and edited the final manuscript. All authors read, revised and approved the final manuscript.

### Conflicts of interest

There were no points of conflicts to declare.

### Ethical considerations

Ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the authors.

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